CLAIMS

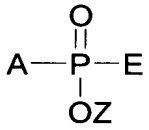
1. A process for utilizing hypophosphorous acid or its salts thereof as a chain transfer agent in the aqueous polymerization of acrylic acid with allyloxy monomers to form an acrylic acid copolymer, comprising:

a) charging the allyloxy monomer initially to the polymerization reactor,

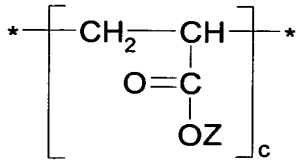
b) metering into the polymerization reactor the hypophosphorous acid and acrylic acid feeds in a staggered fashion such that the hypophosphorous acid feed is from 0% to 75% the duration of the acrylic acid feed,

c) simultaneously charging a water-soluble initiator to the polymerization reactor wherein the duration of the initiator feed is from 0% to 150% the duration of the acrylic acid feed, wherein at least 75 mole % of the hypophosphorous acid charged is incorporated into the resulting polymer matrix.

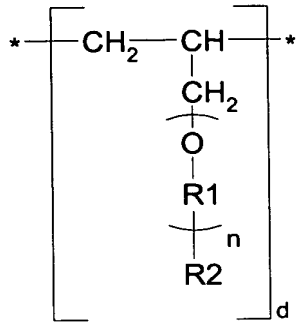
2. The process of claim 1 wherein the acrylic acid copolymer comprises a water-soluble or water-dispersible polymer of the formula



wherein A is a random polymeric residual comprising at least one unit of the formula



and at least one unit of the formula



and E is hydrogen, OZ, a residue A, or mixtures thereof; wherein segment R1 is $-CH_2-CH_2-$, $-CH_2-CH(CH_3)-$, $-CH_2-CH(OH)-$, $-CH_2-CH(OH)-CH_2-$, or mixtures thereof; R2 is OH, SO_3Z, OSO_3Z, PO_3Z_2, OPO_3Z_2, CO_2Z, or mixtures thereof; n ranges from 1 to 100; Z is hydrogen or a water soluble cation such as Na, K, Ca or NH_4; the molar ratio c:d ranges from 30:1 to 1:20.

3. The process of claim 1 wherein the allyloxy monomer is 1-allyloxy-2,3-propanediol; sodium 1-allyloxy-2-hydroxypropyl sulfonate; hydroxypolyethoxy allyl ether; ammonium allylpolyethoxy sulfate; or mixtures thereof.

4. The process of claim 2 wherein R1 is $-CH_2-CH_2-$, $-CH_2-CH(OH)-CH_2-$, or mixtures thereof; R2 is OH, SO_3Z, OSO_3Z or mixtures thereof; n ranges from 1 to 20; Z is hydrogen or a water soluble cation such as Na, K, or NH_4; the molar ratio c:d ranges from 15:1 to 1:10.

5. The process of claim 2 wherein R1 is $-CH_2-CH_2-$; R2 is OSO_3Z; n ranges from 5 to 20; Z is hydrogen or a water soluble cation such as Na, K, or NH_4; the molar ratio c:d ranges from 15:1 to 2:1.

6. The process of claim 1 wherein at least 85 mole % of the hypophosphorous acid charged is incorporated into the resulting polymer matrix.

7. The process of claim 1 wherein said copolymers are added to an aqueous system in an effective amount for the purpose of controlling corrosion and the deposition of scale imparting participates on the structural parts in contact with the aqueous system.

8. The process of claim 7 wherein the allyloxy monomer is 1-allyloxy-2,3-propanediol; sodium 1-allyloxy-2-hydroxypropyl sulfonate; hydroxypolyethoxy allyl ether; ammonium allylpolyethoxy sulfate; or mixtures thereof.

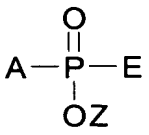
9. The process of claim 7 further comprising adding to the aqueous system an effective amount for the purpose a topping agent selected from the group consisting of polyacrylates, phosphoric acid and water-soluble salts thereof, phosphonic acids and water-soluble salts thereof, azole compounds, and polyepoxysuccinic acids.

10. The process of claim 1 wherein said hypophosphorous acid or salt thereof is shot fed to the polymerization prior to feed of said acrylic acid to said reactor.

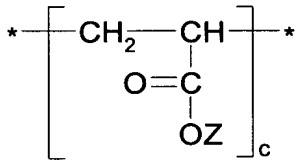
11. The process of claim 1 wherein said hypophosphorous acid feed is for about 50% - 75% of the duration of said acrylic acid feed.

12. Polymer made by the process of claim 1.

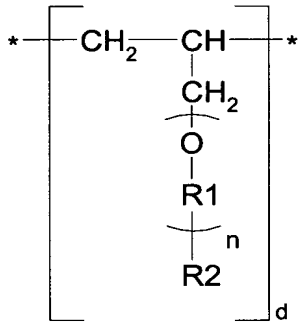
13. Water-soluble or water dispersible polymer of the formula comprising a water-soluble or water dispersible polymer of the formula



wherein A is a random polymeric residual comprising at least one unit of the formula



and at least one unit of the formula



and E is hydrogen, OZ, a residue A, or mixtures thereof; wherein segment R1 is $-CH_2-CH_2-$, $-CH_2-CH(CH_3)-$, $-CH_2-CH(OH)-$, $-CH_2-CH(OH)-CH_2-$, or mixtures thereof; R2 is OH, SO_3Z, OSO_3Z, PO_3Z_2, OPO_3Z_2, CO_2Z, or mixtures thereof; n ranges from 1 to 100; Z is hydrogen or a water soluble cation such as Na, K, Ca or NH_4; the molar ratio c:d ranges from 30:1 to 1:20.

14. Polymer as recited in claim 13 wherein R1 is $-CH_2-CH_2-$, $-CH_2-CH(OH)(CH_2)-$, or mixtures thereof; R2 is OH, SO_3Z, OSO_3Z or mixtures thereof;

n ranges from 1 to 20; Z is hydrogen or a water soluble cation such as Na, K, or NH_4; the molar ratio c:d ranges from 15:1 to 1:10.

15. Polymer as recited in claim 13 wherein R1 is $-CH_2-CH_2-$; R2 is OSO_3Z; n ranges from 5 to 20; Z is hydrogen or a water soluble cation such as Na, K, or NH_4; the molar ratio c:d ranges from 15:1 to 2:1.